

1911  
T32

THATCHER

Design of a Portable  
Asphalt Paving Plant

Mechanical Engineering

B. S.

1911

UNIVERSITY OF ILLINOIS  
LIBRARY

Class  
1911

Book  
T32

Volume





1532  
124  
2070

**DESIGN OF A PORTABLE ASPHALT  
PAVING PLANT**

BY

**GEORGE WILLIAM THATCHER**

---

**THESIS**

FOR THE

**DEGREE OF BACHELOR OF SCIENCE**

IN

**MECHANICAL ENGINEERING**

---

**COLLEGE OF ENGINEERING**

**UNIVERSITY OF ILLINOIS**

**1911**



UNIVERSITY OF ILLINOIS

May 29 1901

THIS IS TO CERTIFY THAT THE THESIS PREPARED UNDER MY SUPERVISION BY

George William Thatcher

ENTITLED Design of a Portable Asphalt  
Paving Plant

IS APPROVED BY ME AS FULFILLING THIS PART OF THE REQUIREMENTS FOR THE

DEGREE OF

Bachelor of Science in  
Mechanical Engineering

John A. Dent

Instructor in Charge.

APPROVED:

W. Goodenough

HEAD OF DEPARTMENT OF

Mechanical Engineering



Digitized by the Internet Archive  
in 2013

<http://archive.org/details/designofportable00that>

## A PORTABLE ASPHALT PAVING PLANT.

The one car asphalt paving plant, sketches of which follow, is designed with a capacity of laying 1300 square yards of sheet asphalt pavement a day. To accomplish this, the plant must be able to handle 125 cubic yards of stone and sand, and 19 tons of asphaltic cement. The number of men required to operate is from 16 to 20.

The plant designed is limited to a certain degree in its construction. It is all contained on one railway car of special design, so that its clearance is 15 feet in height and ten feet in width, with a length not to exceed 65 feet.

The first essential considered is the strength of the car and machinery. The hard usage of such a plant demands stronger and heavier beams than the ordinary car of its size. The car itself is formed by two 24 inch I beams, 65 feet with sufficient lateral bracing and truss rods. The arrangement consists first; of the boiler located at the front end of the car, which provides the steam for melting the asphalt, and running the engines. To one side is located the feed-water jumps, while in the rear is the air jump. Beneath the boiler are located the air-tank and feed-water heater.

Next to the boiler is located the sand and stone drum over which is saddled the asphalt tank. Such an arrangement gives a great economy in space. It also utilizes



the heat radiated from the drum in assisting to melt the asphalt.

The melting of the asphalt is accomplished by steam, which does not permit the temperature to rise over 370 Fahrenheit, and burn the asphalt. The tanks are divided into three compartments, and a little over one compartment will furnish enough asphaltic cement for a days run. It requires about five hours to melt down a compartment. The asphalt is agitated by steam after being melted. The pipes for conducting the asphalt to the mixer are all steam jacketed so as not to allow the material to harden in them during cold weather. The condensate from the tanks return through a trap to the hot well, and is pumped into the boiler. The asphalt hoist is fastened to the side of the asphalt tank.

The sand drum is of the direct heat type, the hot gases drawn directly through it by a blower located at front end. It is of ample size for any possible requirement. It is driven by a vertical engine at its front end, which also operates the cold sand and stone elevator and blower.

At the rear end of the tank and over the drum fire box is located the oil tank and oil pump. Alongside of the oil tank is the hot sand and stone elevator, and a vertical engine which drives it by means of worm gearing. The engine also drives the hoise for the asphalt to load tanks.

At the rear end of the car is located the mixing platform which, when the plant is set up for operation, can be moved



off the car sidewise to permit the wagons to drive under and load. When the plant is to be shipped, the supports of the platform are easily removed and the platform moved back on the car. The platform contains two mixers, one for top and one for binder. They are driven by gears from a horizontal engine located on the platform. Directly over the mixers are placed the sand and stone bins respectively, which can be lowered for shipment, or raised for operation by four upright screws supporting them.

The Equipment consists of:-

Steam Plant:-

1:-The boiler which furnishes steam to the engines and for melting the asphalt is of the internal fired return flue marine type, 125 H.P., 165 # steam pressure.

2:-The feed pump is a simple, direct acting  $5\frac{1}{2}$ " X  $3\frac{3}{4}$ " X 7 standard make.

3:-A standard closed type heater, 18" diameter by 5 feet long is used. The exhaust from feed and air pumps supply the heat; the drum and hoist engine is also arranged so that its exhaust can be used for heating feed water if desired.

Heating Apparatus:-

1:-The asphalt tank is 28' long and 9' wide, constructed of  $\frac{3}{8}$ " iron, and braced as in detail drawing. It is divided into 3 compartments, each of which has a capacity of 12 tons. In each compartment are located 4 coils of  $1\frac{1}{4}$ " double strength continuous pipe, containing 910 lineal feet.



2:-The sand and stone drum is 28 feet long by 4 feet 6 inches in diameter and runs at a speed of 9 R.P.M. It is mounted on rollers, with inclination of  $\frac{1}{2}$  inch to foot to carry the material through it. The end thrust is taken up by rollers mounted on vertical spindles. The drum is constructed of  $\frac{3}{8}$ " sheet iron. It has a system of <sup>sand</sup> plates to increase the heating surface and keep material continually agitated.

3:-The furnace is lined in fire brick and contains 25 square feet grate surface.

4:- The blower which induces the draft is a No.55 American Blower Company fan, speed 900 R.P.M.

5:-The engine used to drive the cold stone and sand hoist is a vertical enclosed type, single cylinder 7 X 7, 30 H.P. at 300 R.P.M.

#### Handling Apparatus:-

1:-The cold stone and sand elevator contains elevator buckets 10" X 6", spaced 15".

2:-The hot sand and stone elevator contains 10" X 6" elevator buckets, spaced 15" and is enclosed in a  $1\frac{1}{2}$  X 3' sheet iron case of a standard type.

3:-The screw conveyer is 12" diameter steel screw running in a five foot steel conveyer box.

4:-The stone and sand bins each have a capacity of 5 cu. yards. They are made of  $\frac{1}{4}$ " sheet iron, braced with  $1\frac{1}{2}$ " angles. A 24" screen is used in the sand bin.

5:-The asphalt hoist has a five foot radius and



is constructed from a 4" double extra strength pipe. The hoisting is done by means of a simple hoist of the drum type, driven directly from the hot stone and sand elevator engine through a steel friction clutch.

6:-The engine operating the hoist and elevator is a vertical enclosed single cylinder 6 X 6, 20 H.P. at 300 R.P.M.

7:-A Westinghouse air pump direct acting, 6" X 10" X 10" is used to supply air to force the asphalt from the tanks through the pipes to the mixer platform. This is done by sealing each compartment when used, and turning on the air.

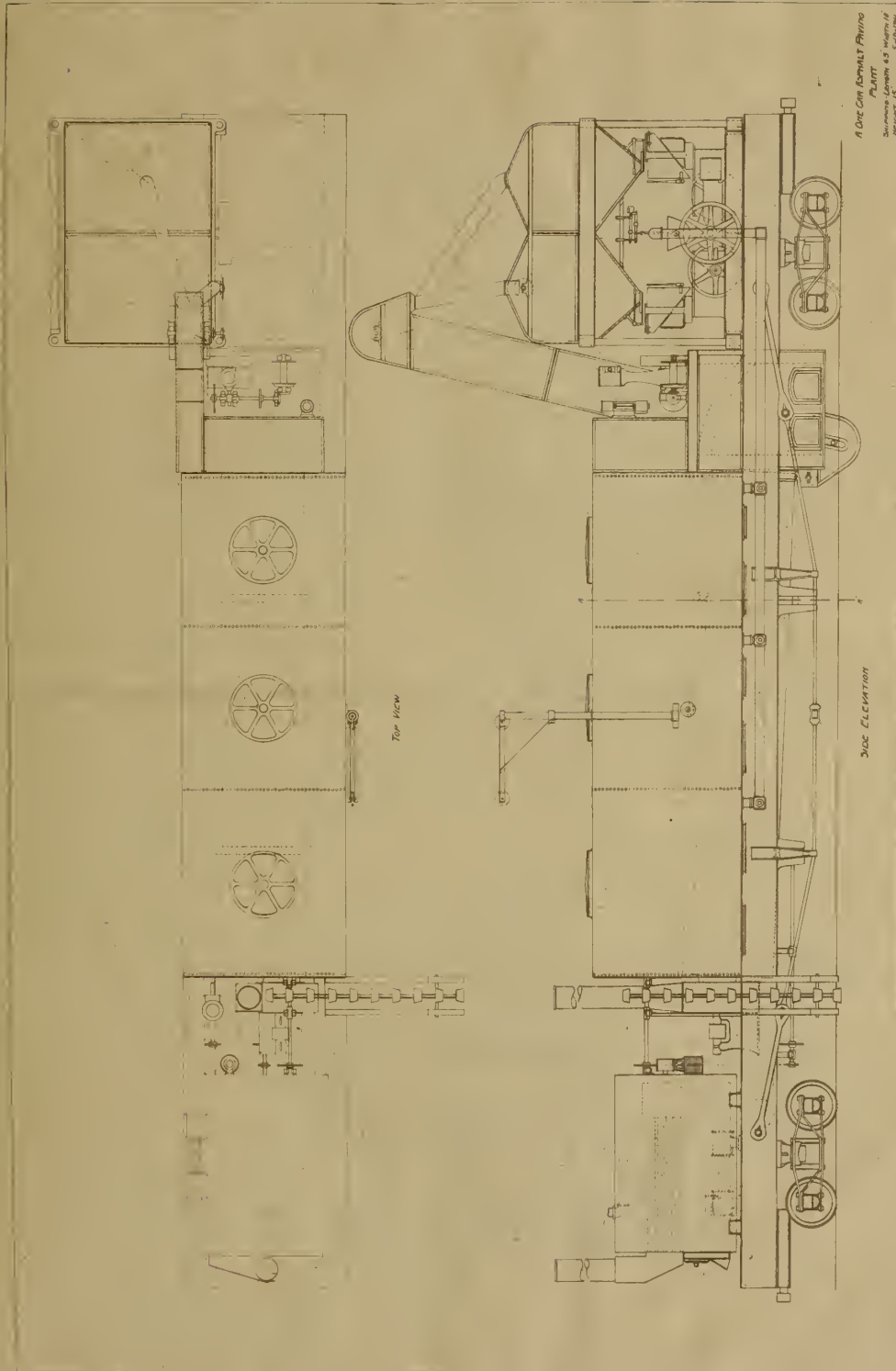
8:-An oil pump, 5" X  $5\frac{1}{2}$ " X 7" direct acting, is used to pump oil to the oil tanks, and from there to each compartment of the asphalt tank. The oil tank holds 5480# oil.

#### Mixing Machinery:-

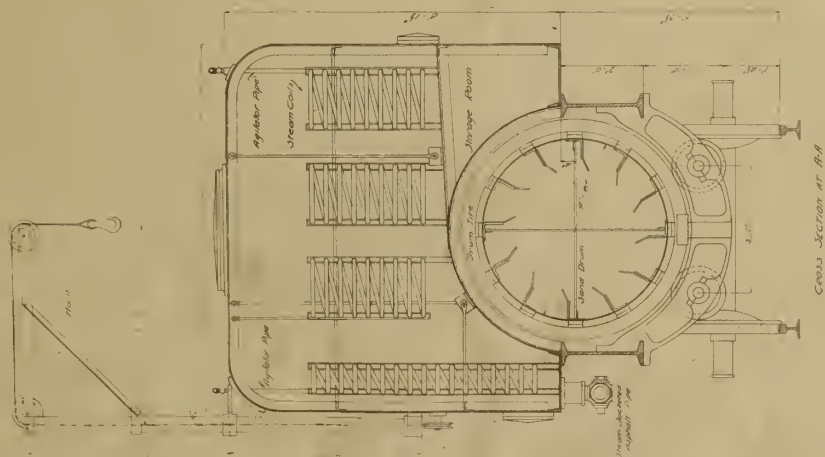
1:-Two mixers of standard make are used, one for the top mixture, 3' -  $7\frac{1}{2}$ " wide, and 5 feet long, and one for the binder mixture, 3' -  $7\frac{1}{2}$ " wide and 4'-3" long. They run at 60 R.P.M.

2:-The engine used to operate them is a horizontal simple engine 8 X 8, 30 H.P. at 300 R.P.M.









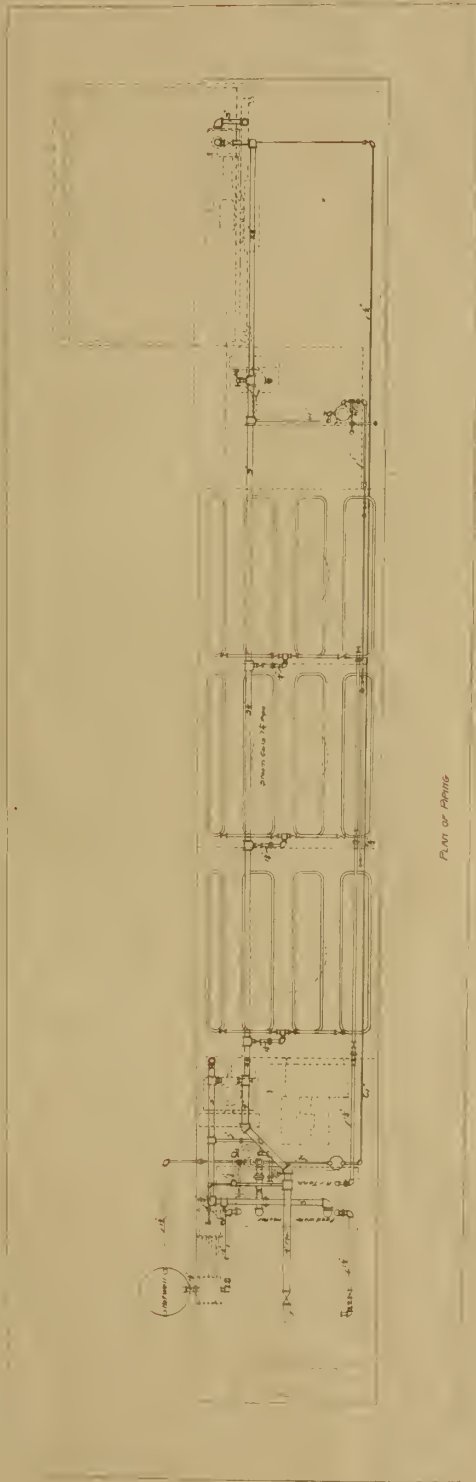


Architectural drawing of a circular well or cistern, showing a cross-section and plan view. The drawing includes the following dimensions and labels:

- Top Wall:** 2'-5"
- Side Wall:** 2'-0"
- Bottom Wall:** 4'-9"
- Base:** 10"
- Plan View Dimensions:**
  - Outer Square: 5'-0 1/2"
  - Inner Circle: 3'-0"
  - Radius: 6'-2"
  - Depth: 4'-1 1/2"
- Labels:** "ABOVE THE CEMENT" (appearing twice on the side walls)

SECTION THRU DRUM FURNACE

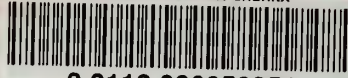








UNIVERSITY OF ILLINOIS-URBANA



3 0112 086858351